

## **Title: Jammin' with Geometry**

### **Brief Overview:**

Students will apply their knowledge of diameter, radius, and the use of a compass to design their own geometrically designed compact disk cover.

### **NCTM 2000 Principles for School Mathematics:**

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*
- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*
- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*
- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*
- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*
- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

### **Links to NCTM 2000 Standards:**

#### **• Content Standards**

##### **Geometry**

- *Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.*
- *Specify locations and describe spatial relationships using coordinate geometry and other representational systems.*
- *Apply transformations and use symmetry to analyze mathematical situations.*
- *Use visualization, spatial reasoning, and geometric modeling to solve problems.*

##### **Measurement**

- *Understand measurable attributes of objects and the units, systems, and processes of measurement.*
- *Apply appropriate techniques, tools, and formulas to determine measurements.*

#### **• Process Standards**

##### **Reasoning and Proof**

- *Recognize reasoning and proof as fundamental aspects of mathematics.*
- *Make and investigate mathematical conjectures.*
- *Develop and evaluate mathematical arguments and proofs.*
- *Select and use various types of reasoning and methods of proof.*

### **Communication**

- *Organize and consolidate their mathematical thinking through communication.*
- *Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.*
- *Analyze and evaluate the mathematical thinking and strategies of others.*
- *Use the language of mathematics to express mathematical ideas precisely.*

### **Connections**

- *Recognize and use connections among mathematical ideas.*
- *Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
- *Recognize and apply mathematics in contexts outside of mathematics.*

### **Representation**

- *Create and use representations to organize, record, and communicate mathematical ideas.*
- *Select, apply, and translate among mathematical representations to solve problems.*
- *Use representations to model and interpret physical, social, and mathematical phenomena.*

### **Grade/Level:**

Grade 4 or 5

### **Duration/Length:**

Three days

### **Prerequisite Knowledge:**

Students should have working knowledge of the following skills:

- Measurement ( customary and metric)
- Persuasive writing
- How to use a compass

### **Student Outcomes:**

Students will:

- apply real-life knowledge of radius and diameter.
- create a geometrically proportional compact disc by constructing circles.
- identify and create polygons within a given area.

### **Materials/Resources/Printed Materials:**

- Ruler
- Pencil
- Compass
- White card stock paper
- Scissors
- Crayons, colored pencils or markers
- One compact disc (teacher)
- Student and Teacher Resource Sheets

## **Development/Procedures:**

### **Day #1:**

1. Review geometry vocabulary:
  - A. circle
  - B. radius
  - C. concentric circles
  - D. polygons
  - E. chords
2. Construct concentric circles. (Teacher Resource Sheet #1)
  - A. The teacher will model the steps to make the geometric construction found on Teacher Resource Sheet #1. Students will need a pencil, paper, and compass to complete the construction.
  - B. Before making the construction, tell students that they are making a design for a compact disk cover.
3. Create a geometric design within concentric circles.

### **Day #2:**

1. Have students color, paste, and cut out compact disks.
2. Distribute vignette involving writing to persuade prompt (Student/Teacher Resource Sheet #1), and have students read and discuss it.
3. Have students complete graphic organizer. (Student Resource Sheet #2)
4. Students will write a persuasive letter. (Student Resource Sheets #3 and #4)

### **Day #3:**

1. Have students complete persuasive letter.
2. Have students share designs with classmates.

## **Performance Assessment:**

- Students will be assessed on their ability to construct concentric circles using the given radii. (See scoring tool on Teacher Resource Sheet #2.)
- Students will be assessed on the polygons created within their compact discs. (See scoring tool on Teacher Resource Sheet #2.)
- Students will be assessed on the persuasive letter written to the band leader. (See scoring tool on Teacher Resource Sheet #3.)
- Students will be assessed on an ongoing basis through teacher observation, participation, and cooperative group effort.

## **Extension/Follow Up:**

- Guide the students through the editing and revision stages of the writing process.
- Have students create other geometric designs using different size circles.
- Create other geometric designs using polygons rather than circles.

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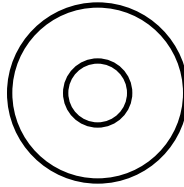
# Compass Creations

Read the following directions to create a geometric design using chords, diameters, arcs, and circles. Follow each direction step by step.

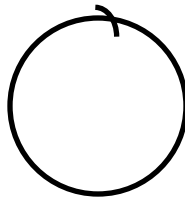
1. Use a compass to construct circle A with a radius of 1 cm. Using a black crayon or marker, trace around this circle.



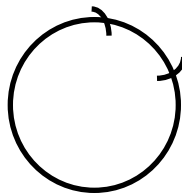
2. Using your compass, construct circle B with a radius of 6 cm from the center of circle A.



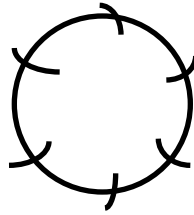
3. Make a small arc at the top of circle B that intersects with the circle.



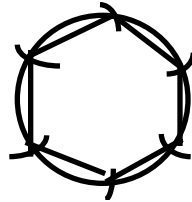
4. Using the compass, measure a 6 cm distance from the point where the arc intersects the circle. Make an arc with the compass that creates a second point of intersection with the circle.



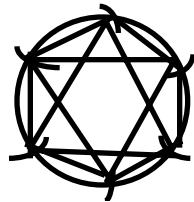
5. Move the compass to the new arc and repeat this process until you have six arcs that create six points of intersection equal distant around your circle.



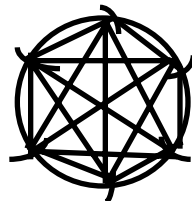
6. Connect side-by-side points with a straight line.



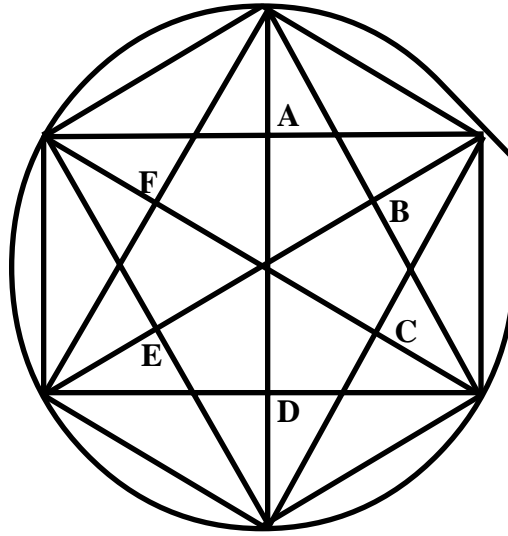
7. Connect every other point with a straight line.



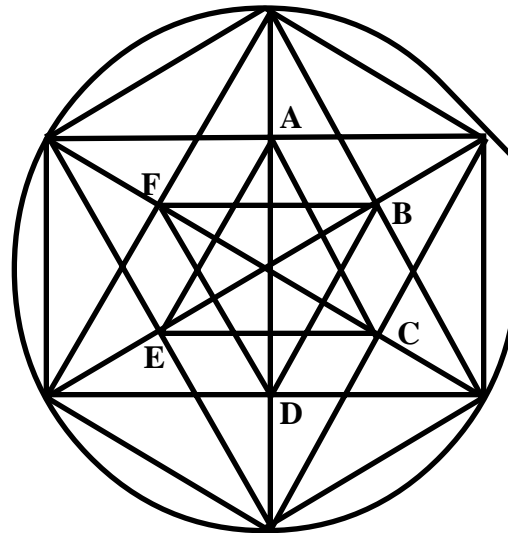
8. Connect opposite points with a straight line.



9. Label intersecting points of diagonals and chords:  
A,B,C,D,E,F



10. Connect:  
A and C  
C and E  
E and A  
B and D  
D and F  
F and B



11. Cut circle A out of the center and discard.
12. Using the geometric shape that you have just created, use your crayons, markers or colored pencils to color in the spaces. Use different colors or whatever creative ideas you desire.

Good Luck and Have Fun!!

# Scoring Tool-

## Geometric Design

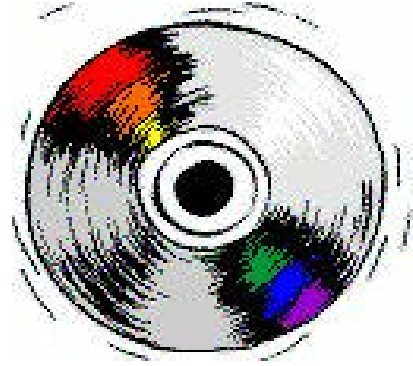
- \_\_\_\_\_ Has correctly formed concentric circles.
- \_\_\_\_\_ Has 6 points of intersection of equal distance around your circle.
- \_\_\_\_\_ Followed directions correctly to create geometric design.
- \_\_\_\_\_ Neat and Colorful
- \_\_\_\_\_ Total Points

# Scoring Tool - Persuasive Letter

1. \_\_\_\_\_ Uses correct business letter format.
2. \_\_\_\_\_ Uses correct audience.
3. \_\_\_\_\_ Uses math vocabulary.
4. \_\_\_\_\_ Discusses the types of polygons created.
5. \_\_\_\_\_ Explains why your CD design should win.
6. \_\_\_\_\_ Uses a topic sentence.
7. \_\_\_\_\_ Uses a concluding sentence.
8. \_\_\_\_\_ Uses correct capitalization.
9. \_\_\_\_\_ Uses correct word usage and spelling.
10. \_\_\_\_\_ Uses correct punctuation.



# *Vignette*



## **Persuasive Writing Prompt**

The Poly-Gon band is having a world wide search for the perfect CD cover design. Your teacher has entered your design in the contest. Write a persuasive letter explaining why your design should be chosen. Please send your letter to the following address:

The Poly-Gon Band  
1482 Rock-N-Roll Avenue  
Jammin, MD 99999

Good Luck!!

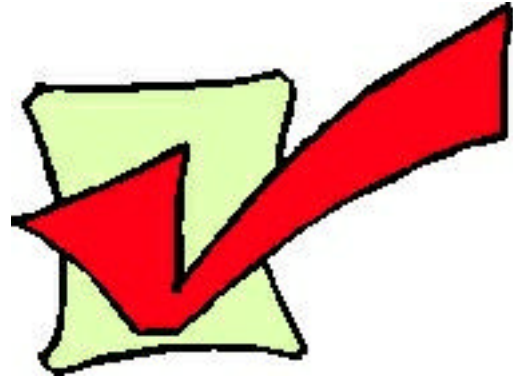
NAME \_\_\_\_\_

# ROCKIN' ORGANIZER



My 3 reasons for  
being the “BEST!”

# Jammin' Checklist



1. \_\_\_\_\_ Uses correct business letter format.
2. \_\_\_\_\_ Uses correct audience.
3. \_\_\_\_\_ Uses math vocabulary.
4. \_\_\_\_\_ Discusses the types of polygons created.
5. \_\_\_\_\_ Explains why your CD design should win.
6. \_\_\_\_\_ Uses a topic sentence.
7. \_\_\_\_\_ Uses a concluding sentence.
8. \_\_\_\_\_ Uses correct capitalization.
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10. \_\_\_\_\_ Uses correct punctuation.

# Business Letter

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